Protein aggregation and degradation during iodine labeling and its consequences for protein adsorption to biomaterials

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Protein adsorption on modified and unmodified polymer surfaces investigated through radiolabeling experiments showed a tendency for higher than expected albumin and immunoglobulin G (IgG) adsorption. Possible enhanced protein aggregation and degradation caused by the iodine labeling method used were analyzed through chromatography and spectroscopy techniques. Results show that the iodine labeling method using chloramine-T (CAT) as an oxidizing agent can cause both enhanced aggregation and fragmentation of proteins. Albumin shows an enhanced tendency to aggregate after iodine labeling using the CAT method, and higher amounts of fragmentation are observed for CAT-labeled IgG molecules relative to unlabeled IgG molecules as well as to IgG molecules labeled using the Iodo-Gen method. These results show that the widely applied method of radioisotope labeling for quantitative assessment of protein adsorption should be used with caution and preferably should be validated by a label-free methodology for each combination of radio-label and protein. The results obtained in this study can be used to optimize investigation of protein adsorption on surfaces of materials for biomedical devices. (c) 2006 Elsevier Inc. All rights reserved.